

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Application of:

Susan Gaye Elkington, et al.

§ Confirmation No. 4068

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Serial No.: 10/823,241 § Group Art Unit: 2184

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For: RESOURCE MANAGEMENT § Atty Docket: 200401303-1

SYSTEM

HPQB:0169

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/Nathan E. Stacy/

Nathan E. Stacy

**APPEAL BRIEF PURSUANT
TO 37 C.F.R. §§ 41.31 AND 41.37**

This Appeal Brief is being filed in response to the Final Office Action mailed on August 15, 2008, and in furtherance of a Notice of Appeal filed September 18, 2009. The Notice of Appeal was filed simultaneously with a Petition to Revive. The Granting of the Petition was dated November 25, 2009, with the statement that the Appeal Brief was due within two months of the date the Petition was granted. Therefore, this Appeal Brief is timely filed on January 21, 2010.

1. REAL PARTY IN INTEREST

The real party in interest is Hewlett-Packard Development Company, LP, a limited partnership established under the laws of the State of Texas and having a principal place of business at 11445 Compaq Center Dr. W, Houston, TX 77070, U.S.A. (hereinafter "HPDC"). HPDC is a Texas limited partnership and is a wholly-owned affiliate of Hewlett-Packard Company, a Delaware Corporation, headquartered in Palo Alto, CA. The general or managing partner of HPDC is HPQ Holdings, LLC.

2. RELATED APPEALS AND INTERFERENCES

The Appellants are unaware of any other appeals or interferences related to this Appeal. The undersigned is Appellants' legal representative in this Appeal.

3. STATUS OF CLAIMS

Claims 1-21 are currently pending, are currently under rejection and, thus, are the subject of this appeal.

4. STATUS OF AMENDMENTS

There are no amendments made after the Final Office Action of August 15, 2008, to be considered by the Board. However, the Appellants are unsure if the Examiner made the amendments to claims 19-21 that were submitted in an earlier Response, dated May 7, 2008, to the non-Final Office Action dated February 7, 2008. In the Final Office Action, the Examiner made statements that tend to indicate that these amendments were overlooked, as discussed below.

5. SUMMARY OF CLAIMED SUBJECT MATTER

The Application contains four independent claims, namely, claims 1, 8, 15 and 19, all of which are the subject of this Appeal. As an example, the independent claims relate generally to a data handling system (*e.g.*, 100, 200, or 500) and an associated method (*e.g.*, 300 or 400) to improve performance with respect to overall latency. *See*

Application, p. 3, ll. 3-6; Figs. 1-5. The illustrative method (e.g., 300 or 400) can improve performance in any suitable type of data handling system that includes resources with limited capacity. *See id.*; Figs. 3 and 4. In a particular example, the technique is applied to array controller systems (e.g., 102, 202, or 502). *See id.*; Figs. 1, 2, and 5. The application also contains dependent claims 2-7, 9-14, 16-18, 20, and 21. The subject matter of claims 1, 8, 15, and 19 is summarized below.

With regard to independent claim 1, discussions of the recited features can be found at least in the below-cited locations of the specification and drawings. By way of example, claim 1 recites a method (e.g., 300 or 400) of managing resource usage that includes pushing commands indicating accesses of at least one resource (e.g., 110 or 508) onto at least one resource queue (e.g., 112 or 510). *See id.* at p. 4, ll. 5-7; ll. 12-16; p. 11, ll. 26-29; p. 13, l. 33- p. 1; 14, Figs. 1, 3, 4A, 4B, and 5. The queue depth in the at least one resource queue (e.g., 112 or 510) is monitored (e.g., 302 or 404) for a predetermined level of resource consumption. *See id.* at p. 11, ll. 29-30; p. 12, ll. 26-27; p. 14, ll. 4-5; Figs. 1, 3, 4 and 5. The issue of subsequent commands from a client (e.g., 204) of at least one client to a server (e.g., 100, 200, or 500) of at least one server in response to a command from the client to the server that increases resource consumption to the predetermined level is prevented (e.g., 306 or 410). *See id.* at p. 4, ll. 16-18; p. 8, ll. 1-3; p.11, ll. 30-32; p. 12, ll. 26-28; p. 14, ll. 8-9; Figs. 1, 3, 4A, and 5. The client and the server for which the command increases resource consumption to the predetermined level is identified as a client/server combination identifier. *See id.* at p. 4, ll. 15-18; p. 11, ll. 33-34; p. 12, ll. 29-30; p. 14, ll. 5-7; Figs. 1 and 3. The client/server combination identifier is pushed (e.g., 308 or 412) onto a waiting queue (e.g., 116 or 514) associated with a resource (e.g., 110 or 510) for which the resource consumption is increased to the predetermined level, the waiting queue (e.g., 116 or 514) for queuing a plurality of client/server combination identifiers. *See id.*, p. 5, ll. 10-15; p. 12, ll. 29-30; p. 14, ll. 5-8; Figs. 1, 4A, 3. A decline in consumption of a resource (e.g., 110 or 510) of the at least one resource is detected (e.g., 310 or 422). *See id.*, p. 11, l. 34-p. 12, l. 2; p.12, ll. 32-34; p. 14, l. 34-p. 15, l. 1; Figs. 1, 3, 4B, 5. A client/server combination identifier is popped

(e.g., 312 or 424) from a waiting queue (e.g., 116 or 514) associated with the resource (e.g., 110 or 510) for which a decline in consumption is detected in order of queuing. p. 11, l. 34-p. 12, l. 2; p. 12, l. 34-p. 13, l. 2; p. 14, l. 34-p. 15, l. 2; Figs. 1, 3, 4B, 5. The issue of commands from the client to the server designated by the popped client/server combination identifier is re-enabled (e.g., 314 or 426). *See id.*, p. 12, ll. 2-4; p. 13, ll. 2-3; p. 15, ll. 2-4; Figs. 1, 3.

With regard to dependent claim 3, which depends from claim 1, discussions of the recited features can be found at least in the below-cited locations of the specification and drawings. By way of example, claim 3 recites that the method of claim 1 further includes enabling (e.g., 314 or 426) issue of commands from a client to a server identified by a client/server combination identifier in order of queuing as resource availability is restored. *See id.* at p. 12, ll. 1-3; p. 13, ll. 2-3; Figs. 3 and 4.

With regard to dependent claim 5, which depends from claim 1, discussions of the recited features can be found at least in the below-cited locations of the specification and drawings. By way of example, claim 5 recites that the method of claim 1 further includes detecting (e.g., 304 or 406) an increase in consumption of a resource to a level above a preselected limit, and pushing (e.g., 308 or 412) the client/server combination identifier on a waiting queue associated with the resource. *See id.* at p. 11, ll. 33-34, p. 12, ll. 29-30; Figs. 3 and 4.

With regard to dependent claim 6, which depends from claim 5, discussions of the recited features can be found at least in the below-cited locations of the specification and drawings. By way of example, claim 6 recites detecting (e.g., 310 or 422) a decline in consumption of the resource, removing (e.g., 312 or 424) a client/server combination identifier from the waiting queue in the queue order, and enabling (e.g., 314 or 426) subsequent commands from a client to a server identified by the client/server combination identifier removed from the waiting queue for operation. *See id.* at p. 11, l. 34-p. 12, l. 4; p. 12, l. 33-p. 13, l. 3; Figs. 3 and 4.

With regard to independent claim 8, discussions of the recited features can be found at least in the below-cited locations of the specification and drawings. By way of example, claim 8 recites a storage system (e.g., 100 or 200) that includes at least one storage controller (e.g., 102 or 202) controlling data transfers between at least one host adapter (e.g., 104 or 204) and at least one storage array (e.g., 106 or 212). *See id.* at p. 3, l. 31-p. 4, l. 1; p. 5, ll. 27-32; p. 7, ll. 7-9; Figs. 1 and 2. The storage array (e.g., 106) may be configured as physical storage (e.g., 108 or 214) and logical storage, the logical storage being arranged in logical units (LUNs) (e.g., 216). *See id.* at p. 4, ll. 1-3; p. 7, ll. 9-11; Figs. 1 and 2. The storage system (e.g., 100 or 200) may also include at least one resource (e.g., 110 or 210) utilized in the data transfers, and at least one resource queue (e.g., 112) respectively associated with the at least one resource (e.g., 110 or 210) that queues commands indicating accesses to the associated resource. *See id.* at p. 4, ll. 5-7; ll. 12-13; p. 6, ll. 23-26; Figs. 1 and 2. Further, the storage system (e.g., 100 or 200) includes a logic (e.g., 114 or 208) that pushes commands indicating accesses of at least one resource onto at least one resource queue (e.g., 112) and monitors queue depth in the at least one resource queue (e.g., 112) for a predetermined resource consumption condition. *See id.* at p. 4, ll. 13-14; p. 6, ll. 22-26; p. 7, ll. 1-4; Figs. 1 and 2. The logic (e.g., 114 or 208) detects a condition of an adapter (e.g., 104 or 204) that issues a command to a LUN that contributes to the predetermined resource consumption condition. *See id.* at p. 4, ll. 15-18; p. 7, ll. 2-4; Fig. 1. The adapter (e.g., 104 or 204) that issues the command and the LUN are identified by the logic (e.g., 114) as an adapter/LUN combination identifier. *See id.* at p. 4, ll. 15-18; p. 7, ll. 11; Figs. 1 and 2. The adapter/LUN combination identifier is pushed by the logic (e.g., 114) onto a waiting queue (e.g., 218) for queuing a plurality of adapter/LUN combination identifiers associated with a resource (e.g., 110 or 210) for which the resource consumption is increased to the predetermined level. *See id.* at p. 4, ll. 16-18; p. 7, ll. 11-13; Figs. 1 and 2. The logic (e.g., 114) prevents issue of subsequent commands of the identified adapter/LUN combination. *See id.* at p. 4, ll. 16-18; p. 7, ll. 4-7; Figs. 1 and 2.

With regard to dependent claim 9, which depends from claim 8, discussions of the recited features can be found at least in the below-cited locations of the specification and drawings. By way of example, claim 9 recites that the storage system of claim 8 further includes a logic (e.g., 114 or 208) that detects a decline in resource consumption of a predetermined resource (e.g., 110 or 210), dequeues the adapter/LUN combination identifier from a waiting queue (e.g., 116 or 218) associated with the predetermined resource (e.g., 110 or 210) for which a decline in consumption is detected, and re-enables commands of the dequeued adapter/LUN combination for operation. *See id.* at p. 5, ll. 12-16; p. 7, ll. 15-16; Figs. 1 and 2.

With regard to dependent claim 13, which depends from claim 8, discussions of the recited features can be found at least in the below-cited locations of the specification and drawings. By way of example, claim 13 recites that the storage system of claim 8 further includes a logic (e.g., 114 or 208) that detects an increase consumption of a resource (e.g., 110 or 210) above the preselected limit, and queues an adapter/LUN combination identifier on a waiting queue (e.g., 116 or 218) associated with the (e.g., 110 or 210) resource. *See id.* at p. 6, ll. 13-18; p. 6, l. 22; p. 7, ll. 2-4; p. 7, ll. 11-13; Figs. 1 and 2.

With regard to dependent claim 14, which depends from claim 13, discussions of the recited features can be found at least in the below-cited locations of the specification and drawings. By way of example, claim 14 recites that the storage system of claim 13 further includes a logic (e.g., 114 or 208) that detects a decline in consumption of the resource (e.g., 110 or 210), removes an adapter/LUN combination identifier from the waiting queue (e.g., 116 or 218) in the queue order, and enables subsequent commands of the adapter/LUN combination removed from the waiting queue (e.g., 116 or 218) for operation. *See id.* at p. 4, ll. 20-22; p. 7, ll. 15-20; Figs. 1 and 2.

With regard to independent claim 15, discussions of the recited features can be found at least in the below-cited locations of the specification and drawings. By way of example, claim 15 recites a data handling system (e.g., 500) that includes at least one controller (e.g., 502) controlling data transfers between at least one client (e.g., 504A-C) and at least one server (e.g., 506A-F). *See id.* at p. 13, ll. 31-33; Fig. 5. The system (e.g., 500) includes at least one resource (e.g., 508) that is utilized in the data transfers and at least one resource queue (e.g., 510) respectively associated with the at least one resource that queues commands indicating accesses to the associated resource (e.g., 508). *See id.* at p. 13, l. 33-p. 14, l. 1; Fig. 5. The data handling system (e.g., 500) also includes a logic (e.g., 512) that pushes commands indicating accesses of at least one resource (e.g., 508) onto at least one resource queue (e.g., 510). *See id.* at p. 14, ll. 2-4; Fig. 5. The logic (e.g., 512) monitors queue depth in the at least one resource queue (e.g., 510) for a predetermined resource consumption condition. *See id.* at p. 14, ll. 4-5; Fig. 5. The logic (e.g., 512) detects a condition of a source that issues a command to a client that contributes to the predetermined resource consumption condition, identifying the source that issues the command and the client by a client/source combination identifier. *See id.* at p. 14, ll. 4-8; Fig. 5. The logic (e.g., 512) pushes the source/client combination identifier onto a waiting queue (e.g., 514) for queuing a plurality of client/server combination identifiers associated with a resource (e.g., 508) for which the resource consumption is increased to the predetermined level. *See id.* The logic also prevents issue of subsequent commands of the identified source/client combination. *See id.* at p. 14, ll. 8-9; Fig. 5.

With regard to dependent claim 17, which depends from claim 15, discussions of the recited features can be found at least in the below-cited locations of the specification and drawings. By way of example, claim 17 recites that the data handling system of claim 15 further includes a logic (e.g., 512) that detects an increase in consumption of a resource (e.g., 508) above the preselected limit, queues a client/server combination identifier on a waiting queue (e.g., 514) associated with the resource. *See id.* at p. 14, ll. 5-8; Fig. 5.

With regard to dependent claim 18, which depends from claim 17, discussions of the recited features can be found at least in the below-cited locations of the specification and drawings. By way of example, claim 18 recites that the data handling system of claim 17 further includes a logic (e.g., 512) that detects a decline in consumption of the resource (e.g., 508), removes a client/server combination identifier from the waiting queue (e.g., 514) in the queue order, and enables subsequent commands of the client/server combination removed from the waiting queue for operation. *See id.* at p. 14, l. 34-p. 15, l. 4; Fig. 5.

With regard to independent claim 19 discussions of the recited features can be found at least in the below-cited locations of the specification and drawings. By way of example, claim 19 recites an article of manufacture that includes a computer readable medium having a readable program code embodied therein for managing resource usage. *See id.* at p. 13, ll. 16-19. The readable program code includes code to cause a controller to push commands indicating accesses of at least one resource onto at least one resource queue. *See id.* at p. 11, ll. 26-29. The code causes the controller to monitor (e.g., 302) for a predefined level of resource consumption. *See id.* at p. 11, ll. 29-30; Fig. 3. The code causes the controller to prevent issue (e.g., 306) of subsequent commands from a client of at least one client to a server of at least one server in response to a command from the client to the server that increases resource consumption to the predefined level. *See id.* at p. 11, ll. 29-33; Fig. 3. The code causes the controller to identify the client and the server for which the command increases resource consumption to the predetermined level as a client/server combination identifier. *See id.* at p. 11, ll. 33-34. The code causes the controller to push (e.g., 308) the client/server combination identifier onto a waiting queue associated with a resource for which the resource consumption is increased to the predetermined level, the waiting queue for queuing a plurality of client/server combination identifiers. *See id.* at p. 11, ll. 33-34; Fig. 3. The code causes the controller to detect a decline (e.g., 310) in consumption of a resource of the at least one resource and, when a decline is detected, to pop (e.g., 312) a client/server combination identifier from a waiting queue associated with the resource for which a decline in consumption is

detected in order of queuing. *See id.* at p. 11, l. 34-p. 12, l. 2; Fig. 3. Further, the code causes the controller to enable (*e.g.*, 314) issue of commands from the client to the server designated by the popped client/server combination identifier. *See id.* at p. 12, ll. 2-4; Fig. 3.

6. **GROUNDS OF REJECTION TO BE REVIEWED ON APPEAL**

A. First Ground of Rejection for Review on Appeal

The Appellants respectfully urge the Board to review and reverse the Examiner's first ground of rejection in which the Examiner rejected claims 19-21 under 35 U.S.C. § 101 because the claimed invention is directed to non-statutory subject matter.

B. Second Ground of Rejection for Review on Appeal

The Appellants respectfully urge the Board to review and reverse the Examiner's second ground of rejection in which the Examiner rejected claims 1-21 under 35 U.S.C. § 103(a) as being obvious over U.S. Patent Application Publication No. 2002/0013864 by Dandrea, et al. (hereinafter "Dandrea") in view of U.S. Patent No. 6,922,414 to Gunlock (hereinafter "Gunlock").

7. **ARGUMENT**

As discussed in detail below, the Examiner has improperly rejected the pending claims. Further, the Examiner has misapplied long-standing and binding legal precedents and principles in rejecting the claims under 35 U.S.C. §§ 101 and 103(a). Accordingly, the Appellants respectfully request full and favorable consideration by the Board, as the Appellants assert that claims 1-21 are currently in condition for allowance.

A. Ground of Rejection No. 1

With respect to the rejection of claims 19-21 under 35 U.S.C. § 101 as being directed to non-statutory subject matter, the Examiner focused on claim 19, specifically stating:

The phrase, “a tangible processor usable medium” in the claims 19-21 are a non-statutory subject matter (see MPEP 2106.01) because the definitions found in the disclosure did not exclude an unpatentable medium such as an optical, electromagnetic, and/or propagating signal (see Instant Application, Paragraph 58, Lines 7 and 14. An amendment deleting evidence relied upon does not remove it from the original disclosure to overcome, the rejection must be accompanied by a clear disavowal of the deleted subject matter). Since, “a tangible processor usable medium” could be construed as optical, electromagnetic, and/or propagating signal medium, “a tangible processor usable medium” then would not be any of the statutory subject matter, a “process, machine, manufacture, or composition of matter.”

Final Office Action, p. 2. In a previous response, the Appellants amended the claims and specification to be directed to a tangible storage medium.

The Appellants note that claim 19 was amended in the last Response, dated May 7, 2008, prior to the Final Office Action, which was dated on August 15, 2008. As amended, claim 19 should recite, *inter alia*, “a tangible processor usable computer readable medium having a readable program code embodied therein.” As noted by the Examiner, the Specification was amended in the last Response to read: “A computer-readable medium can be any structure, device, component, product or other means that can store, communicate, propagate, or transport the program for use by or in connection with the instruction execution system, apparatus, or device.” With respect to the amendment to the Specification, the Examiner stated: “Regarding the 35 U.S.C. §101, Applicant's a clear disavowal of the deleted subject matter would overcome these rejections.” Final Office Action, p. 12. Accordingly, the Appellants clearly state that the amendments above are intended to clearly indicate that the scope of the “computer readable medium” of claims 19-21 is directed to tangible storage devices, such as hard disks, floppy disks, thumb drives, memory, including RAM and ROM, holographic disks, and any other tangible storage medium. Furthermore, the “computer readable medium” of the claims 19-21 does not cover any unpatentable software transfer medium based on

signals, including optical signals, electromagnetic signals, or any other type of propagating signals.

Thus, the computer readable medium of claims 19-21 is a tangible medium, which is considered to be patentable subject matter under 35 U.S.C. § 101. Accordingly, the Appellants respectfully request that the Board reverse the rejection under 35 U.S.C. § 101.

B. Ground of Rejection No. 2

The Appellants respectfully urge the Board to review and reverse the Examiner's second ground of rejection in which the Examiner rejected claims 1-21 under 35 U.S.C. § 103(a) as being obvious over Dandrea in view of Gunlock. The Examiner focused on claims 1, 8, 15 and 19, explaining that Dandrea discloses all elements of the claims, except that Dandrea does not disclose:

identifying the client and the server for which command increases resource consumption to the predetermined level as a client/server combination identifier; and

the waiting queue for queuing a plurality of client/server combination identifiers

However, the Examiner claims that Gunlock does disclose:

identifying the client and the server (frame header, see Fig. 5, D_ID 502, and S_ID 504; Note, the packet frame contains source to destination information), for which command increases resource consumption to the predetermined level (command queue overflow, see Column 10, Line 51) as a client/server combination identifier (D_ID/S_ID, see Column 10, Line 6 and Fig. 6/7; Note, device specific access request leads to identifying LUN); and

the waiting queue (command queue, see Column 10, Line 51) for queuing a plurality of client/server combination identifiers (command frame, see Column 2, Lines 33-36).

Final Office Action, pp. 3-7. The Appellants respectfully traverse this rejection.

Claims 1-21

As a preliminary matter, the Appellants respectfully note that the rejection of the claims based on Gunlock is improper. Pursuant to 35 U.S.C. § 103(c), it is not proper to use Gunlock as the basis of a rejection under 35 U.S.C. § 103. As stated by 35 U.S.C. § 103(c)(1):

Subject matter developed by another person, which qualifies as prior art only under one or more of subsections (e), (f), and (g) of section 102 of this title, shall not preclude patentability under this section where the subject matter and the claimed invention were, at the time the claimed invention was made, owned by the same person or subject to an obligation of assignment to the same person.

Gunlock et al. was filed on August 21, 2000, but was not published until it issued on July 26, 2005. The instant application (U.S. Serial No. 10/823,241) was filed on April 12, 2004. Therefore, Gunlock could only be considered prior art to the instant application under 35 U.S.C. § 102(e).

Further, Gunlock was assigned to Hewlett-Packard Development Company, L.P., by way of an assignment recorded at Reel/Frame: 014177/0428, dated December 2, 2003. The present application, U.S. Serial No. 10/823,241 was also assigned to Hewlett-Packard Development Company, L.P, by way of an assignment recorded at Reel/Frame: 015030/0438, and dated August 12, 2004. The Assignment for the present application was executed by all of the inventors on or before July 16, 2004. Thus, both Gunlock and the present application were subject to an obligation of assignment of ownership to the same party at the time of the invention of the present application.

Accordingly, the Appellants respectfully request that the Board disregard Gunlock as a reference. Further, as discussed below, the Examiner has admitted that the primary reference, Dandrea, does not disclose all of the elements of the present claims. Therefore, the Appellants respectfully request that the Board reverse the rejection of claims 1-21 under 35 U.S.C. § 103(a).

Notwithstanding the deficiency of Gunlock as prior art to the instant application, the Appellants will nonetheless explain how the combination of Gunlock and Dandrea, even if proper, fails to render the claims of the instant application obvious. The burden of establishing a *prima facie* case of obviousness falls on the Examiner. *Ex parte Wolters and Kuypers*, 214 U.S.P.Q. 735 (B.P.A.I. 1979). To establish *prima facie* obviousness of a claimed invention, all the claim limitations must be taught or suggested by the prior art. *In re Royka*, 180 U.S.P.Q. 580 (C.C.P.A. 1974). Although a showing of obviousness under 35 U.S.C. § 103 does not require an express teaching, suggestion or motivation to combine prior art references, such a showing has been described by the Federal Circuit as providing a “helpful insight” into the obviousness inquiry. *KSR Int'l. Co. v. Teleflex, Inc.*, No. 04-1350, 550 U.S. 398, 82 U.S.P.Q.2d 1385 (2007). Moreover, obviousness cannot be established by a mere showing that each claimed element is present in the prior art. *Id.* The Examiner must cite a compelling reason why a person having ordinary skill in the art would combine known elements in order to support a proper rejection under 35 U.S.C. § 103. *Id.*

In the instant application, the Appellants claim systems and methods that manage resource usage using two distinct types of queues: (1) resource queues for holding commands indicating accesses of resources; and (2) waiting queues for holding identifiers of the combination of a client and server for a condition that the client sending a command to the server increases resource consumption to a predetermined level. Accordingly, independent claim 1 recites “identifying the client and the server for which the command increases resource consumption to the predetermined level as a client/server combination identifier,” and “pushing the client/server combination

identifier onto a waiting queue associated with a resource for which the resource consumption is increased to the predetermined level, the waiting queue for queuing a plurality of client/server combination identifiers.” Similarly, independent claim 8 recites a logic that is “identifying the adapter that issues the command and LUN by an adapter/LUN combination identifier” and is “pushing the adapter/LUN combination identifier on a waiting queue for queuing a plurality of adapter/LUN combination identifiers associated with a resource for which the resource consumption is increased to the predetermined level.” Independent claim 15 recites a logic that is “identifying the source that issues the command and the client by a client/source combination identifier” and is “pushing the source/client combination identifier on a waiting queue for queuing a plurality of client/server combination identifiers associated with a resource for which the resource consumption is increased to the predetermined level.” Independent claim 19 also recites “a code causing the controller to identify the client and the server for which the command increases resource consumption to the predetermined level as a client/server combination identifier” and “a code causing the controller to push the client/server combination identifier onto a waiting queue associated with a resource for which the resource consumption is increased to the predetermined level, the waiting queue for queuing a plurality of client/server combination identifiers.”

In contrast, Dandrea discloses a system with multiple queues functionally analogous to the resource queues but fails to show any element that is structurally, functionally, or operationally analogous to the Appellants' claimed waiting queue or identifier of a combination of client and server. The Examiner admits that Dandrea does not disclose the claimed aspects of operation, but refers to support for the aspects in Gunlock in figures 5, 6, and 7, and column 10, lines 51 and 6, and column 2, lines 33-36. However, as discussed above, Gunlock is not a proper reference under 35 U.S.C. § 103(a) in light of 35 U.S.C. § 103(c). Further, even if Gunlock were to be considered a proper reference, it does not remedy the deficiencies of Dandrea.

The channel frame structure depicted by Gunlock in figure 5 and the description in column 9, line 63, to column 10, line 40, relate to a frame with destination identification field (D_ID) and a source identification field (S_ID), failing to teach that the destination/source pair are identified for the condition of the command increasing resource consumption to the predetermined level. In Appellants' claimed system and technique, the client/server combination is not defined until detection of the specified condition (the command involving the specific client and server increasing resource consumption above the predetermined level). Upon occurrence of the condition, the client/server combination is recognized and identified. The client/server combination identifier, which does not exist until the specified condition, is then queued onto the waiting queue. Thus the waiting queue only contains client/server combination identifiers for which the specified condition is present. In contrast, the destination identification (D_ID) and source identification (S_ID) are written to the frame header described by Gunlock irrespective of any resource consumption condition. The combination identifiers disclosed by Gunlock are fundamentally different from what is claimed by the Appellants since none are defined by the specified condition.

The Examiner refers to the command queue taught in column 10, line 51, of Gunlock both as disclosure of Appellants' claimed condition (a command that increases resource consumption to the predetermined level) and a waiting queue for queuing a plurality of client/server identifiers, creating several logical inconsistencies. First, a queue as claimed by the Appellants in which the elements queued are defined by a previous predetermined condition would never contain any elements if the predetermined condition is the filling of the queue. Second, the queue could never fill to cause the predetermined condition which creates the elements since no elements could ever be placed on the queue.

Thus, even if Gunlock were a proper reference, no hypothetical combination of Dandrea and Gunlock discloses all of the elements recited in independent claims 1, 8, 15, or 19. Accordingly, these claims are allowable over Dandrea and Gunlock. For at least

the same reasons, their respective dependent claims 2-7, 9-14, 16-18, 20, and 21 are allowable over the cited references. Accordingly, the Appellants respectfully request that the Board reverse the rejection of claims 1-21 under 35 U.S.C. § 103(a).

Claim 3

Claim 3 further distinguishes over the combination of Dandrea in view of Gunlock which fails to disclose "enabling issue of commands from a client to a server identified by a client/server combination identifier in order of queuing as resource availability is restored." Neither Dandrea nor Gunlock discloses the client/server combination defined by detection of the specified condition (the command involving the specific client and server increasing resource consumption above the predetermined level) as claimed. For at least this additional reason, the Appellants respectfully request that the Board reverse the rejection of claim 3 under 35 U.S.C. § 103(a).

Claims 5, 13 and 17

Claims 5, 13, and 17 further distinguish over the combination of Dandrea in view of Gunlock which fails to disclose "detecting an increase in consumption of a resource to a level above a preselected limit, and pushing the client/server combination identifier on a waiting queue associated with the resource." Dandrea and Gunlock both fail to disclose the client/server combination defined by detection of the specified condition (the command involving the specific client and server increasing resource consumption above the predetermined level), and queuing the client/server combination identifier as claimed. For at least this additional reason, the Appellants respectfully request that the Board reverse the rejection of claims 5, 13 and 17 under 35 U.S.C. § 103(a).

Claims 6, 9, 14, and 18

Claims 6, 9, 14 and 18 further distinguish over the combination of Dandrea in view of Gunlock which fails to disclose "removing a client/server combination identifier from the waiting queue in the queue order, and enabling subsequent commands from a client to a server identified by the client/server combination identifier removed from the

waiting queue for operation." The hypothetical combination of Dandrea and Gunlock does not disclose the client/server combination defined by detection of the specified condition (the command involving the specific client and server increasing resource consumption above the predetermined level), dequeuing the client/server combination identifier, and re-enabling subsequent commands as claimed. For at least this additional reason, the Appellants respectfully request that the Board reverse the rejection of claims 6, 9, 14 and 18 under 35 U.S.C. § 103(a).

C. Request to Reverse Rejections under 35 U.S.C. §§ 101 and 103(a)

For the reasons discussed above, the Appellants respectfully assert that claims 19-21 are directed to statutory subject matter. Further, the Appellants assert that the Examiner's combination of Gunlock and Dandrea is improper. However, even if proper, Gunlock and Dandrea fail to disclose all of the elements recited in independent claims 1, 8, 15 or 19. Accordingly, the claims are allowable over the combination of Dandrea and Gunlock. For at least the same reasons, their respective dependent claims 2-7, 9-14, 16-18, 20 and 21 are allowable over the cited references. Further, claims 3, 5, 6, 9, 13, 14, 17 and 18 are allowable over the cited references for the additional reasons discussed above. Accordingly, the Appellants respectfully request the Board to reverse the rejections of claims 19-21 under 35 U.S.C. § 101 and claims 1-21 under 35 U.S.C. § 103(a).

Conclusion

The Appellants respectfully submit that all pending claims are in condition for allowance. However, if the Examiner or Board wishes to resolve any other issues by way of a telephone conference, the Examiner or Board is kindly invited to contact the undersigned attorney at the telephone number indicated below.

Respectfully submitted,

Date: January 21, 2010

/Nathan E. Stacy/
Nathan E. Stacy
Reg. No. 52,249
International IP Law Group, P.C.
(832) 375-0200

CORRESPONDENCE ADDRESS:

HEWLETT-PACKARD COMPANY
Intellectual Property Administration
3404 E. Harmony Road
Mail Stop 35
Fort Collins, Colorado 80528

8. **APPENDIX OF CLAIMS ON APPEAL**

Listing of Claims:

1. A method of managing resource usage comprising:

pushing commands indicating accesses of at least one resource onto at least one resource queue;

monitoring queue depth in the at least one resource queue for a predetermined level of resource consumption;

preventing issue of subsequent commands from a client of at least one client to a server of at least one server in response to a command from the client to the server that increases resource consumption to the predetermined level;

identifying the client and the server for which the command increases resource consumption to the predetermined level as a client/server combination identifier;

pushing the client/server combination identifier onto a waiting queue associated with a resource for which the resource consumption is increased to the predetermined level, the waiting queue for queuing a plurality of client/server combination identifiers;

detecting a decline in consumption of a resource of the at least one resource;

popping a client/server combination identifier from a waiting queue associated with the resource for which a decline in consumption is detected in order of queuing; and

re-enabling issue of commands from the client to the server designated by the popped client/server combination identifier.
2. The method according to Claim 1 further comprising:

managing resource usage for clients that require a specific resource.

3. The method according to Claim 1 further comprising:
enabling issue of commands from a client to a server identified by a client/server combination identifier in order of queuing as resource availability is restored.

4. The method according to Claim 1 further comprising:
receiving a command from a client to a server that increases consumption of a resource to a predetermined resource consumption condition;
setting a flag indicative of the predetermined resource condition;
allowing the command to complete; and
rejecting subsequent commands issued by the client to the server.

5. The method according to Claim 1 further comprising:
detecting an increase in consumption of a resource to a level above a preselected limit; and
pushing the client/server combination identifier on a waiting queue associated with the resource.

6. The method according to Claim 5 further comprising:
detecting a decline in consumption of the resource;
removing a client/server combination identifier from the waiting queue in the queue order; and
enabling subsequent commands from a client to a server identified by the client/server combination identifier removed from the waiting queue for operation.

7. The method according to Claim 1 implemented in a storage system further comprising:
at least one storage controller;
at least one host adapter operational as a client;

at least one storage array configured as physical storage and logical storage, the logical storage being arranged in logical units (LUNs) operational as servers;

at least one adapter/LUN combination operational as a client/server combination; and

at least one resource selected from a group consisting of dynamic caching structures, queues, buffers; and remote copy resources.

8. A storage system comprising:

at least one storage controller controlling data transfers between at least one host adapter and at least one storage array configured as physical storage and logical storage, the logical storage being arranged in logical units (LUNs);

at least one resource utilized in the data transfers;

at least one resource queue respectively associated with the at least one resource that queues commands indicating accesses to the associated resource; and

a logic that pushes commands indicating accesses of at least one resource onto at least one resource queue, monitors queue depth in the at least one resource queue for a predetermined resource consumption condition, detects a condition of an adapter that issues a command to a LUN that contributes to the predetermined resource consumption condition, identifying the adapter that issues the command and LUN by an adapter/LUN combination identifier, pushing the adapter/LUN combination identifier on a waiting queue for queuing a plurality of adapter/LUN combination identifiers associated with a resource for which the resource consumption is increased to the predetermined level, and prevents issue of subsequent commands of the identified adapter/LUN combination.

9. The storage system according to Claim 8 further comprising:

a logic that detects a decline in resource consumption of a predetermined resource, dequeues the adapter/LUN combination identifier from a waiting

queue associated with the predetermined resource for which a decline in consumption is detected, and re-enables commands of the dequeued adapter/LUN combination for operation.

10. The storage system according to Claim 8 further comprising:
a logic that manages resource usage for host adapters that require a specific resource.
11. The storage system according to Claim 8 further comprising:
a logic that detects receipt of a command from an adapter to a LUN that increases consumption of a resource above a preselected limit, sets a flag indicative of a predefined condition of the resource, allows the received command to complete, and rejects subsequent commands issued by the adapter to the LUN.
13. The storage system according to Claim 8 further comprising:
a logic that detects an increase consumption of a resource above the preselected limit, and queues an adapter/LUN combination identifier on a waiting queue associated with the resource.
14. The storage system according to Claim 13 further comprising:
a logic that detects a decline in consumption of the resource, removes an adapter/LUN combination identifier from the waiting queue in the queue order, and enables subsequent commands of the adapter/LUN combination removed from the waiting queue for operation.

15. A data handling system comprising:
 - at least one controller controlling data transfers between at least one client and at least one server;
 - at least one resource utilized in the data transfers;
 - at least one resource queue respectively associated with the at least one resource that queues commands indicating accesses to the associated resource; and
 - a logic that pushes commands indicating accesses of at least one resource onto at least one resource queue, monitors queue depth in the at least one resource queue for a predetermined resource consumption condition, detects a condition of a source that issues a command to a client that contributes to the predetermined resource consumption condition, identifying the source that issues the command and the client by a client/source combination identifier, pushing the source/client combination identifier on a waiting queue for queuing a plurality of client/server combination identifiers associated with a resource for which the resource consumption is increased to the predetermined level, and prevents issue of subsequent commands of the identified source/client combination.
16. The system according to Claim 15 further comprising:
 - a logic that detects receipt of a command from a client to a server that increases consumption of a resource above a preselected limit, sets a flag indicative of a predefined condition of the resource, allows the received command to complete, and rejects subsequent commands issued by the client to the server.
17. The system according to Claim 15 further comprising:
 - a logic that detects an increase in consumption of a resource above the preselected limit, queues a client/server combination identifier on a waiting queue associated with the resource.

18. The system according to Claim 17 further comprising:
a logic that detects a decline in consumption of the resource, removes a client/server combination identifier from the waiting queue in the queue order, and enables subsequent commands of the client/server combination removed from the waiting queue for operation.

19. An article of manufacture comprising:
a computer readable medium having a readable program code embodied therein for managing resource usage, the readable program code further comprising:
a code causing a controller to push commands indicating accesses of at least one resource onto at least one resource queue;
a code causing the controller to monitor for a predefined level of resource consumption;
a code causing the controller to prevent issue of subsequent commands from a client of at least one client to a server of at least one server in response to a command from the client to the server that increases resource consumption to the predefined level;
a code causing the controller to identify the client and the server for which the command increases resource consumption to the predetermined level as a client/server combination identifier;
a code causing the controller to push the client/server combination identifier onto a waiting queue associated with a resource for which the resource consumption is increased to the predetermined level, the waiting queue for queuing a plurality of client/server combination identifiers;
a code causing the controller to detect a decline in consumption of a resource of the at least one resource;

a code causing the controller to pop a client/server combination identifier from a waiting queue associated with the resource for which a decline in consumption is detected in order of queuing; and a code causing the controller to enable issue of commands from the client to the server designated by the popped client/server combination identifier.

20. The article of manufacture according to Claim 19 further comprising:

- a code causing the controller to manage resource usage for clients that require a specific resource;
- a code causing the controller to receive a command from a client to a server that increases consumption of a resource above a preselected limit;
- a code causing the controller to set a flag indicative of a condition of the resource;
- a code causing the controller to allow the command to complete; and
- a code causing the controller to reject subsequent commands issued by the client to the server.

21. The article of manufacture according to Claim 19 further comprising:

- a code causing the controller to detect an increase in consumption of a resource above a preselected limit;
- a code causing the controller to queue a client/server combination identifier on a waiting queue associated with the resource;
- a code causing the controller to detect a decline in consumption of the resource;
- a code causing the controller to remove a client/server combination identifier from the waiting queue in the queue order; and
- a code causing the controller to enable subsequent commands from a client to a server identified by the client/server combination identifier removed from the waiting queue for operation.

9. **EVIDENCE APPENDIX**

None.

10. **RELATED PROCEEDINGS APPENDIX**

None.